Interpersonal Control and Expressed Emotion in Families of Persons With Schizophrenia: Change Over Time

by Anne K. Wuerker, Gretchen L. Haas, and Alan S. Bellack

Abstract

This study examined communication patterns in 62 families of persons with schizophrenia, comparing families with relatives who were low expressed emotion (EE) at the beginning and end of a 2-year study, those who were high EE at the beginning and end, and those whose EE status changed. Interaction was coded with the Relational Control Coding System and analyzed as a Markov process. Dialogues in the stable low-EE and stable high-EE families were rather similar initially, and both groups showed increasing flexibility at year 1. However, at year 2, low-EE dyads showed increasingly complex structure and flexibility in control, but high-EE dyads showed simpler structure and rigidly controlling patterns. When EE status changed, so did the structure of the dialogues and the patterning of control. Although earlier research found more “tightly joined” systems in families of high-EE relatives, it may be that over time, these family members distance from each other and so are less connected. It is also possible that relatives who remain high EE despite intervention are a subset of high-EE relatives who need more support or different therapeutic approaches to maintain change.

Keywords: Schizophrenia, expressed emotion, Markov processes, longitudinal study, interpersonal control.


EE is a measure of parental or caregiver attitudes, primarily critical or emotionally overinvolved, which has been shown to be strongly related to the course of illness in schizophrenia, as well as in many other illnesses. Many studies over the past 2 decades have demonstrated that persons with schizophrenia who have a parent who is high EE are four to five times more likely to relapse in the year following hospitalization (Bebbington and Kuipers 1994). Despite the robust nature of this finding, there is still little understanding of the pathways by which parental attitudes and schizophrenia are related (Hooley and Richters 1995). Nevertheless, EE remains central in many studies of schizophrenia and other illnesses because of the consistent relationship between high-EE attitudes and negative course.

Many studies have shown that family interventions decrease the relapse rate of persons with schizophrenia who have high-EE parents. For example, Tarrier et al. (1988) reported a study of 83 patients with schizophrenia; 64 of these were from high-EE households. Patients in high-EE households who received behavioral interventions had a 9-month relapse rate lower than those in the low-EE group, but patients in high-EE households who received routine treatment had a two to three times greater rate of relapse. Nevertheless, several problems remain, the most serious of which is that relapse may be simply postponed rather than avoided. At least two studies have reported that positive results failed to be maintained beyond the first year (Hogarty 1985; Lam 1991). A second problem is that the whole process is poorly understood. Why EE should be such a powerful predictor is not clear; nor is it clear why family interventions are helpful.

Another important issue is that EE is often measured only once, and designating families or households as high EE or low EE adds to the impression that EE is a stable marker of family attitude. The studies that measure EE at more than one time point show that there is a great deal of change in EE attitudes. Most studies show EE moving from high to low, but Dulz and Hand (1986), Scazufca and Kuipers (1998), and Tarrier et al. (1988) reported shifts from low to high in some (ranging from 11% to 18%) study families. One explanation offered by Hooley and Richters (1995) for change over time in EE is that there are both trait and state elements in EE. For example, a parent may have a critical view of the patient in general, but it may become heightened when symptoms increase. Goldstein

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has speculated that there may be differences in relatives who remain high EE. He reports that relatives who were high EE at two time points in his study were more likely to have a family history of serious mental illness and thus perhaps were more vulnerable to the stress of caring for a person with schizophrenia (Goldstein 1995).

Recent studies of communication patterns in families of persons with schizophrenia have shown that high-EE parents and patients are more likely to be competing for control at a verbal level than are low-EE parents and patients (Wuerker 1994, 1996); the patient is often as controlling as or more controlling than the parent. Those studies were cross-sectional, however, and based on recent-onset patients. In contrast, the study described in this article examines interpersonal communication patterns in a group of families of chronically ill patients who were participants in a multifaceted study of treatment of schizophrenia (the Treatment Strategies in Schizophrenia study; Schooler et al. 1997). Communication patterns in families of persons with schizophrenia are described as they change over the 2 years of the study. They are described in terms of interpersonal control, that is, the verbal patterning of the negotiation of “who’s in charge,” assessed through the use of the Relational Control Coding System (RCCS; Ericson and Rogers 1973) at each of the assessment points. The resulting communication sequences are then analyzed as a Markov process.

Markov Processes

As Rogers and colleagues (1985) note, the study of family patterns on a systems level requires systems-level analysis. Data must be collected and analyzed sequentially to understand process at the most basic level of message and response. However, analysis of data on a true systems level also requires the inclusion of change over time to capture the dynamics of a process. Markov process analysis allows the researcher to incorporate time, and thus dynamics, in a truly systemic fashion, without concepts of linear causality and with a probabilistic framework that seems to suit human communication systems very well. Communication patterns generally, and relational control patterns specifically, have been shown to be Markovian (Manderscheid et al. 1982; Vuchinich 1984; Wuerker 1996). The standard assumptions underlying Markov models are order, stationarity, and homogeneity. Order refers to the number of states needed for prediction of the present state of the system. First order means that only the immediately prior state is needed. “State” in the current study is the control direction (one-up, one-down, or one-across) of a speech in a dialogue, so first order means that to know the probabilities of an assertive, submissive, or neutral speech from person B, one would need to know only the control direction of the prior speech by person A. Second order means that information from two prior time points is required. In the current study, that means one would have to know the immediately prior control direction of person A’s speech and the control direction of B’s speech before that. Stationarity means that the probabilities do not change over time, in the present case over the time of the dialogue. Homogeneity means that the same probabilities hold for all members of the population. In the current study, homogeneity is used to mean role homogeneity, that is, the probabilities are the same whether the patient or the relative is the speaker.

Order, stationarity, and homogeneity can be readily assessed with log-linear models. See Gottman and Roy (1990) and Gottman (1995) for a general discussion of the use of log-linear models for sequential analysis and Wuerker (1996) for specific examples using the RCCS.

Most Markov studies of dyadic communication have found second or third order patterning (e.g., Manderscheid et al. 1982; Vuchinich 1984). Previous studies of transactions in high-EE families have found a more “tightly joined” system (Cook et al. 1989) and greater serial dependency (Hahlweg et al. 1989), implying a higher order structure. In a recent study that assessed order in families of persons with schizophrenia, Wuerker (1996) found that patterns in low-EE families were second order but patterns in high-EE dual-parent families were third order, perhaps reflecting this more “tightly joined” system. Most of the above studies also found that the patterns were homogeneous and stationary. Based on previous studies, therefore, we expected that the low-EE families in the current study would show second order patterning and the high-EE families would initially show third order structure. A number of researchers have found rigid communication to be associated with high-EE attitudes (e.g., Hahlweg et al. 1989; Hubschmid and Zemp 1989; Wuerker 1994, 1996), so we expected there would be more change in low-EE families. We also expected communication patterns in all families to be homogeneous and stationary initially, because these were relatives and patients who had been relating with each other for years and would be expected to have very stable patterns. However, participation in a study can affect patients and relatives differently, so we expected that there would be change in homogeneity over time. Stationarity could change as well, although it is less likely than is the case for homogeneity, because the dialogues on which the patterns are based are short (10 minutes).

Relational Control. Relational control refers to a specific transactional process, that of defining and negotiating interpersonal control. In other words, relational control has to do with the distribution of power in a relationship and the issues of dominance and submission. The RCCS
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is based on the theoretical orientation of Bateson (1958) and on concepts of symmetry and complementarity evolving from that work. Symmetry refers to a similarity of control, for example, when a one-up (↑) message—an attempt to define oneself as in charge—is countered by another one-up message, by the other's assertion of being in charge (↑↑); or when a one-down (↓) message—relinquishing control—is followed by another one-down, by the other's message of giving up control (↓↓). Complementarity is the reverse; one person seeks control and the other yields (↑↓), or one person wants to be controlled and the other takes charge (↓↑). Rogers (1973) added a transitional category (neutral or →) to represent a speech that carried the dialogue along without either seeking or giving up control. Although complementarity and symmetry are both important elements in defining relationships, neither pattern is necessarily problematic as such. Rather, difficulties in control occur when one partner, or both, primarily respond in one control direction or in one pattern—for example, when one partner almost always asserts control when speaking with the other. Inflexible control patterns can be on the level of an individual who usually responds in one manner, or on the level of the dyad. An example of the latter is the couple who “argue over everything”; the content of the disagreements is secondary to the process of disagreement. However, complementarity can be inflexible as well, as when one person usually asserts control and the other usually allows control. Conversely, flexibility in control implies that both content and context are taken into account, and so the process varies accordingly.

Earlier studies of interaction in families of persons with schizophrenia have shown that families with high-EE relatives are more likely to be competing for control compared with families with low-EE parents (Wuerker 1994, 1996). Patterns in families with low-EE parents are more likely to be those of neutral symmetry or flexible complementarity. A recent study of interaction patterns of couples in Spain showed the same patterns, that is, couples who had sought marital counseling were more likely to show competitive symmetry, and those who had not were more likely to use neutral transactions (Escudero et al. 1997).

In the current study, the expectations were based on previous, although limited, research findings. In terms of control patterns, we expected that dyads with relatives who stayed high EE throughout the study would be competing for control at all three assessment points. We expected that families of relatives who stayed low EE would show more neutral symmetry and more complementarity, as well as more flexible control patterns generally. Other families had changing patterns of EE, and an interesting question is whether control patterns change with change in EE.

Methods

Subjects. This study used the audio portion of videotapes collected for research on communication behavior (Bellack et al. 1996) in patients and families receiving treatment as part of the longitudinal National Institute of Mental Health–funded Treatment Strategies in Schizophrenia (TSS) Collaborative Study (Schooler et al. 1997). In the TSS study, subjects (drawn from five sites across the country) were patients between the ages of 18 and 55 with DSM-III-R research diagnoses of schizophrenia, schizoaffective disorder, or schizophreniform disorder made by a research clinician using the Structured Clinical Interview for DSM-III-Psychotic Disorders (Spitzer and Williams 1985). For inclusion in the TSS study, subjects had to have a family member willing to participate in the family therapy component of the study; this family member was usually a parent but could be a relative serving in a caretaking role (e.g., an aunt, an uncle, or a grandparent). Subjects who met the stabilization criteria were randomly assigned to one of two family treatments (applied or supportive) and one of three medication conditions (standard, low-dose, or targeted medication) as described in a previous publication (Schooler et al. 1997).

All families in the TSS study were first invited to attend a psychoeducational workshop modeled on the survival skills workshop developed by Anderson and coworkers (1986). They were then assigned to a family management clinician. Families assigned to the Supportive Family Management (SFM) condition were encouraged to attend monthly family group meetings that continued through the 2 years of the study. The family management clinician also provided case management and consultation for problems when the family asked for assistance. Families assigned to the Applied Family Management (AFM) condition had the same opportunities but also received family treatment sessions in their homes for the first year. All families received either AFM or SFM. At the conclusion of the study, the investigators reported that there were no clinical or outcome differences between the two groups (Schooler et al. 1997). Families in AFM and SFM attended the monthly meetings at the same rate, and analyses of interaction style in the families showed no differences between the families who received AFM and those who received SFM (Bellack et al., submitted for publication). The investigators also concluded that family engagement and support were probably effective based on the lower rate of relapse and rehospitalization compared with rates reported in other studies of similar patients, although there was no “no-family-treatment” control group to assess that outcome (Schooler et al. 1997). It may be worth noting that a similar but smaller study with “treatment-resistant patients” com-
pared supportive family treatment and behavioral family
treatment and had the same results; both approaches were
deemed equally effective (Zastowny et al. 1992).

The study of interaction (described in Bellack et al.
1996) from which the data for the current research were
drawn began after some of the patients were entered into
the treatment protocol. Of the original 528 patients
treated into the TSS study, 313 met stabilization criteria
for random assignment to family treatment. Family
assessments were obtained on 256 of the 313, but over
half of these families (138) were evaluated at one time
only. Of the patients who had only one assessment, almost
all had either baseline data (40%) or year 2 data (slightly
less than 60%). Almost half of the remaining families did
not have both EE assessments and interaction data for two
time points, or did not have both baseline and year 2 data.
The current report is based on the 62 families who had
both EE and interaction data for at least baseline and year
2; all except three of these families had data for all three
assessments.

Of the patients in the 62 families the current sample
comprises, 48 (77%) were male and 21 (34%) were black.
Their mean age was 28.8 (standard deviation [SD] 7.5)
years. Of the 313 patients in the overall study, 67 percent
were male and 49.4 percent were black. Their mean age
was 29.6 years at entry into the study. Although there
were fewer females and fewer blacks in the current study
than in the original study, the differences did not reach
statistical significance.

There were also no significant differences in gender,
race, or age among the original 313 patients, the patients
who participated in only one family assessment, or the
patients who had two assessments but not both Family
Problem-Solving Task (FPST) and EE data or not baseline
and year 2 data. There were no differences in the percentage
of high-EE assessments among the families who had
EE data, that is, comparing the 256 with FPST data, the
138 who were evaluated at one time only, or the 56 who
had two assessments but incomplete data. All had
between 28 percent and 31 percent high-EE assessments.
Therefore, the 62 families in the current study appear to
be representative of the families in the original TSS study.

Because EE was assessed at all three time points and
the EE status of many of the relatives changed during the
study, the patient-relative dyads were grouped according
to their patterns of EE. Group 1, designated as LLL, were
dyads in which the relatives were low EE throughout the
study (n = 23). Group 2 (HHH) relatives were high EE at
all three points (n = 9). Group 3 (LHL, n = 9) relatives
were low EE at baseline, high EE at year 1, and low EE
again at year 2. Conversely, Group 4 relatives (HLH, n =
5) were high EE, then low EE, then high EE again at year
2. The remaining families were categorized by their initial
EE level and their year 2 level only. Group 5 (L-H, n = 5)
were low EE initially but high EE at year 2, and Group 6
(H-L, n = 11) were initially high EE but low EE at year 2.
Although there were proportionately more women and
more African-Americans in the LLL group, there were no
statistically significant differences between the groups in
terms of age, gender, or race. Table 1 presents the mean
age and the gender and racial breakdown for each of the
six EE groups.

The symptoms and functioning of the patients were
measured at each of the assessment points during the TSS
study (Schooler et al. 1997). There were no significant
differences among the six groups in the Brief Psychiatric
Rating Scale (Overall and Gorham 1988), the Scale for
the Assessment of Negative Symptoms (Andreasen 1982),
or any of the adjustment measures of the Social
Adjustment Scale (SAS II, Schooler and Hogarty 1986;
SAS III, Kreisman and Blumenthal 1985) at any of the
assessment points. However, both the relative’s and the
interviewer's report of the degree of satisfaction the rela-
tive felt with the patient varied with the EE groups at
baseline and year 2. In the SAS, satisfaction on the part of
the relative is measured on a 1–7 scale, 1 being com-

Table 1. Age, gender, and race of patients in EE groups

<table>
<thead>
<tr>
<th>EE group</th>
<th>n</th>
<th>Age, mean (SD)</th>
<th>Males/females</th>
<th>White/black/other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LLL</td>
<td>23</td>
<td>31.3 (7.5)</td>
<td>15/8</td>
<td>11/10/2</td>
</tr>
<tr>
<td>2. HHH</td>
<td>9</td>
<td>25.6 (6.0)</td>
<td>9/0</td>
<td>6/2/1</td>
</tr>
<tr>
<td>3. LHL</td>
<td>9</td>
<td>27.5 (7.1)</td>
<td>9/0</td>
<td>5/3/1</td>
</tr>
<tr>
<td>4. HLH</td>
<td>5</td>
<td>28.8 (9.0)</td>
<td>4/1</td>
<td>2/1/2</td>
</tr>
<tr>
<td>5. L-H</td>
<td>5</td>
<td>23.6 (5.7)</td>
<td>4/1</td>
<td>2/1/2</td>
</tr>
<tr>
<td>6. H-L</td>
<td>11</td>
<td>29.9 (7.9)</td>
<td>7/4</td>
<td>8/3/0</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>28.8 (7.5)</td>
<td>48/14</td>
<td>34/21/7</td>
</tr>
</tbody>
</table>

Note.—EE = expressed emotion; H = high EE; L = low EE; SD = standard deviation.
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Table 2. Means and SDs of relative's satisfaction with patient at baseline and year 2

<table>
<thead>
<tr>
<th>EE group</th>
<th>Baseline satisfaction¹</th>
<th>n</th>
<th>Year 2 satisfaction²</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LLL</td>
<td>3.3 (1.5)</td>
<td>23</td>
<td>3.2 (1.5)</td>
<td>23</td>
</tr>
<tr>
<td>2. HHH</td>
<td>4.5 (1.7)</td>
<td>8</td>
<td>5.1 (1.8)</td>
<td>8</td>
</tr>
<tr>
<td>3. LHL</td>
<td>3.9 (1.6)</td>
<td>9</td>
<td>3.5 (1.9)</td>
<td>8</td>
</tr>
<tr>
<td>4. HLH</td>
<td>4.6 (1.9)</td>
<td>5</td>
<td>4.5 (1.7)</td>
<td>4</td>
</tr>
<tr>
<td>5. L-H</td>
<td>3.8 (1.8)</td>
<td>5</td>
<td>5.2 (1.3)</td>
<td>5</td>
</tr>
<tr>
<td>6. H-L</td>
<td>5.0 (1.3)</td>
<td>11</td>
<td>4.1 (1.8)</td>
<td>11</td>
</tr>
</tbody>
</table>

Note.—ANOVA = analysis of variance; EE = expressed emotion; H = high EE; L = low EE; SD = standard deviation.

¹ ANOVA with satisfaction at baseline by EE group: F = 2.25, df = 5, 55, p < 0.06.
² ANOVA with satisfaction at year 2 by EE group: F = 2.61, df = 5, 53, p < 0.03.
However, the RCCS relies exclusively on verbal messages and is designed to be coded from transcripts or audiotapes. Measures of affect are also not a part of the coding system. What is indexed by the RCCS is the "command" aspect of verbal communication. It is important not to confuse "one-up" messages with negativity. Defining oneself as in charge is not a negative move, and neither is accepting dominance.

The validity of the RCCS has been assessed by a number of investigators (e.g., Ayers and Miura 1981; Heatherington 1988). Ayers and Miura reported good convergent and discriminant validity and high predictive validity for the RCCS. More recently, Heatherington reported good criterion validity in that observers' perceptions of control dynamics were generally consistent with control coding. Interrater reliability has ranged from 80 percent to 93 percent agreement for the grammatical form and response mode codes (Rogers 1973; Manderscheid et al. 1982; McCarrick et al. 1988).

The analysis of relational control with the RCCS offers many advantages in the study of family processes. One is relevance: The process of defining control verbally is central in family interaction. Another is simplicity: The RCCS codes interaction into just three categories (T4- »), allowing sequential analysis without collapsing categories.

Coding procedures are as follows. In this system, each person's turn in the conversation is a coding unit. Each coding unit is viewed as a response to the message that preceded it and is, in that sense, a "definer" of that transaction. The classification of control direction is based on both the grammatical form and the response style of the coding unit. Each speech, or coding unit, is assigned codes for grammatical form (assertion, question, talkover, noncomplete, other) and response mode (support, nonsupport, extension, answer, instruction, order, disconfirmation, topic change, other). By combining grammatical form and response mode, coding units are assigned on the basis of whether the movement is toward dominance of the exchange (T), toward being controlled or accepting dominance («), or toward neutralizing control (»). Table 3 shows the control direction of the various combinations of grammatical form and response mode. An example follows.

Mother: You should help around the house more—you're able to, you know. (Coded as an assertion that is an instruction, T)

Patient: I do help—I put the garbage out yesterday. (Coded as an assertion that is a nonsupport, T)

Mother: No, that was last week. (Assertion, nonsupport, T)

Patient: OK, I'll try to remember. (Assertion, support, i)

Mother: You always say that but then you don't do it. (Assertion, challenge, T)

Patient: Well, sometimes it's hard to remember. (Assertion, extension, »)

Two RAs were trained in the RCCS by the investigator over 1 month, at which time agreement for all codes exceeded 85 percent. Each RA coded one of the two dialogues for each family; whether the problem discussed was one brought up by the patient or by the parents was random. Coders were blind to EE status and diagnosis. Interrater reliability was checked several times during the coding procedure, as was consistency over time. In the current study, reliability as measured by unweighted kappa was 0.85 for grammatical form codes, 0.79 for response mode codes, and 0.76 for control direction, based on 20 percent of the dialogues. An inspection of errors in each set of codes revealed an essentially random pattern.

Analysis. To form the data set for the Markov analysis, contingency tables were constructed with four dimensions: the control direction at t, t + 1, t + 2, and t + 3 (A, B, C, D).
B, C, and D, respectively), using a moving window approach, in which $t$ is moved successively by single coding units. In other words, the data for each dialogue are arranged as a series of control directions for alternating patient and parent responses. Next, sequences are created by using the first four responses for the first sequence, then moving to the second response, overlapping by three and adding one, and then the next, again overlapping by three and adding one, for the whole dialogue. For example, if the codes for the dialogue were $(Pt)\uparrow, (Par)\uparrow, (Pt)\uparrow, (Par)\rightarrow, (Pt)\rightarrow, (Par)\rightarrow,$ and so forth,

- The first sequence would be $(Pt)\uparrow, (Par)\uparrow, (Pt)\uparrow, (Par)\rightarrow.$
- The second sequence would be $(Par)\uparrow, (Pt)\uparrow, (Par)\rightarrow, (Pt)\uparrow.$
- The third sequence would be $(Pt)\uparrow, (Par)\rightarrow, (Pt)\uparrow, (Par)\rightarrow.$

The sequences created using this approach are obviously not independent, but there is some evidence that the effects are negligible (Bakeman and Quera 1995). To assess role homogeneity, a variable signifying whether the initiator (speaker A) was the patient or the parent was added to the analysis. To assess stationarity, a variable signifying whether the given sequence was from the first or the second half of the dialogue was added. Because data in the current study were pooled across subjects (families) and numbers of message-response units varied across families, a variable was created that signified whether the number of interacts for the assessment was more or less than the mean (50). Comparing log-linear models with and without the effects of the variable showed that length of sequences did not significantly affect any of the relevant terms in the models analyzed.

Log-linear analyses were first used to assess order, stationarity, and homogeneity. Log-linear analyses were then used to model the process of interpersonal control at each assessment point and test the hypotheses relative to the process. Computer program BMDPF4 from the Biomedical Data Series (Dixon 1988) was employed for all analyses.

**Results**

The first set of analyses addressed the issue of structure of the six sets of dialogues. Each set of dialogues was assessed for order, stationarity, and role homogeneity separately (that is, dialogues of stable low-EE families at baseline, stable low-EE families at year 1, and so forth). Note that the interaction sequences generated by patient-relative dyads in a particular group were pooled for each assessment point, so the patterns of structure and process reflect those of the group as a whole. Order was assessed by comparing models that included first, second, and third order effects to determine if each effect was significant and if the effects for each order significantly added to the overall model. As described earlier, first order effects are the dependencies of adjacent interacts, in this case, the relationship of the control direction of the response of one person (patient or parent) on the control direction of the preceding message (AB, BC, CD). Second order effects are the dependencies of a response on the message preceding the previous message. In dyadic conversation, this becomes the tendency for a person to continue with the same control direction (AC, BD), but the more complex effect (ABC), representing the dependency of a response on both the adjacent message and the one before that, is also second order. Third order effects are dependencies of a response on the message preceding the previous message (AD) and on the messages and responses preceding that one (ABD, ACD, ABCD).

For the baseline dialogues of stable low-EE dyads, all first order effects were highly significant ($p < 0.0001$), and the simple second order effects were significant as well ($p < 0.0001$). The more complex second order effects, (ABC) and (BCD), and the simple third order effect (AD) were marginally significant ($p < 0.05$), but only second order effects added significantly to the model (Likelihood Ratio Chi-square $[LRX^2] = 440.5, df = 24, p < 0.0001$). Therefore, the process was second order, as expected. (Tables showing the detailed results from the assessment of order, homogeneity, and stationarity are not shown but are available from the first author.)

Note that "order" refers to the degree of dependency in a Markov model and differs from the use of the term in describing log-linear models. Note also that A represents the control direction of a person's speech (or turn in the conversation) at the beginning of the four-speech interact, B is the control direction of the next speech, C the next, and so forth, but that A, B, C, and D refer to location in the sequence and not to whether the patient or the parent is the speaker. However, because this is dyadic interaction, in a given four-speech sequence, A and C are speeches by the same person, and B and D are responses by the other person in the dialogue.

Next, homogeneity was assessed for the low-EE dyads at baseline. "Speaker," whether the speaker was a patient or a parent, added significantly to first, but not second, order effects ($LRX^2 = 21.9, df = 8, p < 0.01$). Patient and parent responded to each other differently, but the process did not differ beyond that. Stationarity was assessed in the same manner. The process did not differ between early and late in the dialogues; therefore, the process was considered stationary.

Order was next assessed for the dialogues of the low-EE dyads at year 1, after 1 year of participating in the TSS study. As before, first and second order effects were...
highly significant ($p < 0.0001$), but third order (AD) and (ABCD) were as well. Overall, third order effects added significantly to the model ($LRX^2 = 29.54, df = 16, p = 0.02$). Therefore, the process was now third order, with more sequential dependency than at baseline. The assessment of homogeneity for these dialogues shows that, at baseline, “speaker” added to first order but not second or third order effects. The process was also stationary as before.

The assessment of order for the dialogues at year 2 showed that all of the first order, most of the second order, and all of the third order effects were significant. Third order effects contributed significantly to the model ($LRX^2 = 97.0, df = 36, p < 0.001$). The low-EE dyads seemed to be increasingly responsive to one another. Assessment of homogeneity showed that, as in the earlier dialogues, “speaker” added to the first order but not the second or third order, and so the process did not differ between relative and patient. The assessment of stationarity showed this process to be stable across the dialogue. Therefore, as expected, baseline dialogues in the stable low-EE families were characterized by second order, stationary, homogeneous structure. In year 1 and continuing in year 2, the structure of the dialogues increased in complexity and responsiveness, contrary to expectations.

Next, the dialogues for the stable high-EE dyads were assessed for order. First order effects were barely significant, indicating that there was little relationship between a statement by one member of the dyad and the response by the other. However, first order effects taken together added significantly to the model, as did second order effects. Several third order effects (AD, ACD) were significant but did not add significantly to the overall model. The process was therefore second order. The process was also stationary and homogeneous, in that none of the first or second order effects differed significantly by speaker (patient or parent). The assessment of order for the same dyads after 1 year of the TSS study shows that there was more sequential dependency, with third order effects adding significantly to the model ($LRX^2 = 57.1, df = 36, p = 0.01$). The process differed between patients and parents, with “speaker” adding significantly to second order effects ($LRX^2 = 23.72, df = 8, p < 0.01$). The process was stationary, as before.

Results for the assessment of order for year 2 showed that none of the third order effects was significant, and third order effects did not contribute significantly to the overall model. Therefore, the process in year 2 was second order, unlike that of year 1 (for second order effects, $LRX^2 = 303.13, df = 24, p < 0.001$). Second order effects differed significantly by speaker and contributed significantly to the overall model ($LRX^2 = 14.89, df = 4, p < 0.005$). The process was homogeneous, like the dialogues at year 1, and stationary.

Dialogues for the remaining four groups of families were then analyzed in the same manner as those of the stable low-EE and the stable high-EE groups. Table 4 displays results from the analyses of order for all six groups, including the ones just described. The structure of families of relatives who were low EE at base and at year 2, but not year 1, looked very similar to the stable low-EE families, in that they showed more sequential structure at year 2. The families of relatives who were high EE at base and year 2 looked similar to the stable high-EE families also, in that they showed second order structure at year 2. Families of relatives who were high EE initially but were low EE at year 2 showed third order structure at year 2 like the other two groups who were low EE at year 2. Finally, families of relatives who low EE at base and high EE at year 2 showed the same second order structure in year 2 as the other groups with high-EE relatives in year 2. Thus, at year 1 and year 2, high-EE dialogues seem to be characterized by second order structure, and low-EE dialogues by third order structure. When EE status of a relative changed, so did the structure of the dialogue between the relative and the patient.

Table 5 displays the results for the homogeneity analyses for the six groups of patient-relative dyads. Changes in homogeneity were related both to EE and to time of assessment. The process in the EE groups that

<table>
<thead>
<tr>
<th>EE group</th>
<th>n</th>
<th>Base year</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LLL</td>
<td>23</td>
<td>2nd &lt; 0.001</td>
<td>3rd &lt; 0.01</td>
<td>3rd &lt; 0.001</td>
</tr>
<tr>
<td>2. HHH</td>
<td>9</td>
<td>2nd &lt; 0.01</td>
<td>3rd &lt; 0.01</td>
<td>2nd &lt; 0.001</td>
</tr>
<tr>
<td>3. LHL</td>
<td>9</td>
<td>2nd &lt; 0.001</td>
<td>2nd &lt; 0.001</td>
<td>3rd &lt; 0.01</td>
</tr>
<tr>
<td>4. HLH</td>
<td>5</td>
<td>2nd &lt; 0.01</td>
<td>2nd &lt; 0.01</td>
<td>2nd &lt; 0.01</td>
</tr>
<tr>
<td>5. L-H</td>
<td>5</td>
<td>2nd &lt; 0.001</td>
<td>2nd &lt; 0.001</td>
<td>2nd &lt; 0.001</td>
</tr>
<tr>
<td>6. H-L</td>
<td>11</td>
<td>2nd &lt; 0.001</td>
<td>3rd &lt; 0.001</td>
<td>3rd &lt; 0.001</td>
</tr>
</tbody>
</table>

Note.—EE = expressed emotion; H = high EE; L = low EE.
Table 5. Results of tests of homogeneity

<table>
<thead>
<tr>
<th>EE group</th>
<th>n</th>
<th>Base year</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LLL</td>
<td>23</td>
<td>1st &lt; 0.01</td>
<td>2nd ns</td>
<td>1st &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd ns</td>
<td></td>
<td>2nd ns</td>
</tr>
<tr>
<td>2. HHH</td>
<td>9</td>
<td>1st ns</td>
<td>2nd &lt; 0.001</td>
<td>1st &lt; 0.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd ns</td>
<td></td>
<td>3rd ns</td>
</tr>
<tr>
<td>3. LHL</td>
<td>9</td>
<td>1st &lt; 0.05</td>
<td>2nd ns</td>
<td>2nd ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd ns</td>
<td></td>
<td>3rd ns</td>
</tr>
<tr>
<td>4. HLH</td>
<td>5</td>
<td>1st ns</td>
<td>2nd &lt; 0.02</td>
<td>1st &lt; 0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd &lt; 0.02</td>
<td></td>
<td>2nd &lt; 0.04</td>
</tr>
<tr>
<td>5. L-H</td>
<td>5</td>
<td>1st &lt; 0.05</td>
<td>2nd ns</td>
<td>2nd ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd ns</td>
<td></td>
<td>3rd ns</td>
</tr>
<tr>
<td>6. H-L</td>
<td>11</td>
<td>1st ns</td>
<td>2nd &lt; 0.04</td>
<td>2nd &lt; 0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd ns</td>
<td></td>
<td>3rd ns</td>
</tr>
</tbody>
</table>

Note.—EE = expressed emotion; H = high EE; L = low EE; ns = nonsignificant.

were low EE at baseline differed only in the relative’s and patient’s immediate response to one another (first order), but not beyond that. In contrast, the process in groups that were high EE at baseline did not differ even in the relative’s and patient’s response to one another. At year 1 and year 2, there continued to be heterogeneity only in the first order effects in the groups that were low EE at baseline, but the process in the three groups that were initially high EE was heterogeneous at the second order level. These changes probably represent the differential impact of the intervention on patients and relatives.

To summarize the analyses of structure, dialogues in the stable low-EE and the stable high-EE dyads were rather similar initially. Both were second order and homogeneous, although the low-EE parents and patients differed in their immediate responses to each other, and the high-EE dyads did not. After the first year of the study, both sets of families showed more responsivity in the dialogues, and both processes were third order. However, in year 2 of the study, low-EE and high-EE dyads differed greatly. The low-EE dyads appeared to continue to develop complexity, but the process in high-EE dyads was once again second order with no sequential dependencies beyond the tendency to stay in the same control mode. The high-EE dyads also differed from the low-EE dyads in that by the second assessment and continuing in the third assessment, the process differed considerably for patient and relative. Thus the expectation that dyads with high-EE relatives would show more sequential structure initially was not supported. In fact, the reverse was found, in that at year 2, the structure of all of the high-EE dyads was second order, and that of the low-EE dyads was third order. The expectation that heterogeneity would increase was supported, however, and all dialogues were stationary, as expected.

Dialogues among the dyads in which EE attitudes changed over the 2 years varied by the EE level at the time, in that the structure of the dialogues changed when EE status changed. For example, the structure of dialogues when the relative was low EE initially but high EE at year 1 and again low EE at year 2 was similar to the LLL dialogues at base and year 2. Dialogues between dyads who were high EE at base but then low EE looked like the LLL dyads after the base assessment. As with the stable families, the patterning of homogeneity was more complex, varying with both the EE level and assessment.

Results thus far have focused on the structure of the dialogues, but understanding the process of interpersonal control is equally important. The next analyses describe the process of control initially and the changes over the 2 years of the study in the family groups. Table 6 displays simple cross-tabulations of observed frequencies of control direction for message-response sequences for the base year and year 2. Note that for these frequencies and for the log-linear models that follow, only the sequences in which the patient is the initiator are used. Otherwise, in dyadic communication, message and response overlap and the separate contribution of patient and relative to the dialogue cannot be understood. Because initial tables showed strong similarities, frequencies from the LLL and LHL dyads are combined, as are those from the HHH and HLH dyads.
Table 6. Percentage of categories of control direction of patient’s message by control direction of parent’s response by EE group and year of study

<table>
<thead>
<tr>
<th>EE group</th>
<th>Control direction of patient’s message</th>
<th>Base year</th>
<th></th>
<th>Year 2</th>
<th></th>
<th></th>
<th></th>
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<tr>
<td></td>
<td></td>
<td>Control direction of parent’s response (%)</td>
<td>Total</td>
<td>Control direction of parent’s response (%)</td>
<td>Total</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>↑</td>
<td>↓</td>
<td>→</td>
<td>↑</td>
<td>↓</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td>Stable low EE†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>↑</td>
<td>38.4</td>
<td>32.5</td>
<td>29.0</td>
<td>37.3</td>
<td>45.1</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>↓</td>
<td>33.3</td>
<td>29.5</td>
<td>37.2</td>
<td>27.1</td>
<td>30.9</td>
<td>27.3</td>
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<tr>
<td></td>
<td>→</td>
<td>29.7</td>
<td>33.2</td>
<td>37.1</td>
<td>35.0</td>
<td>32.1</td>
<td>32.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>33.9</td>
<td>31.9</td>
<td>34.1</td>
<td>100</td>
<td>36.9</td>
<td>31.0</td>
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<tr>
<td>Stable high EE‡</td>
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<tr>
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<td>51.3</td>
<td>27.0</td>
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<td>17.5</td>
<td>58.7</td>
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<td>35.0</td>
<td>50.9</td>
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<tr>
<td></td>
<td>Total</td>
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<td>31.9</td>
<td>29.7</td>
<td>100</td>
<td>52.5</td>
<td>23.7</td>
</tr>
<tr>
<td>Low to high EE</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>↑</td>
<td>31.1</td>
<td>41.1</td>
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<td>20.3</td>
<td>48.7</td>
</tr>
<tr>
<td></td>
<td>↓</td>
<td>34.0</td>
<td>36.2</td>
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<td>31.6</td>
<td>21.2</td>
<td>42.5</td>
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<tr>
<td></td>
<td>→</td>
<td>23.0</td>
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<td>39.5</td>
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<td>Total</td>
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<td>39.4</td>
<td>31.6</td>
<td>100</td>
<td>20.6</td>
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<tr>
<td>High to Low EE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>↑</td>
<td>43.5</td>
<td>27.3</td>
<td>29.2</td>
<td>39.3</td>
<td>31.6</td>
<td>36.2</td>
</tr>
<tr>
<td></td>
<td>↓</td>
<td>42.9</td>
<td>32.8</td>
<td>24.4</td>
<td>28.7</td>
<td>38.2</td>
<td>30.6</td>
</tr>
<tr>
<td></td>
<td>→</td>
<td>29.4</td>
<td>37.9</td>
<td>32.7</td>
<td>32.4</td>
<td>35.3</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>38.7</td>
<td>32.3</td>
<td>29.0</td>
<td>100</td>
<td>34.2</td>
<td>32.1</td>
</tr>
</tbody>
</table>

Note.—↑ = one-up (move toward dominance); ↓ = one-down (move toward submission); → = one-across (neutralizing move); EE = expressed emotion; H = high EE; L = low EE. Boldface highlights percentages described in text, but does not necessarily indicate statistical significance.

1 Includes LLL and LHL.
2 Includes HHH and HLH.

In the base year, high-EE relatives asserted control (↑) more often than low-EE relatives, and competitive symmetry (↑↑) was somewhat more frequent. Patients in the stable high-EE dyads also asserted control more frequently. In year 2, relatives in the stable high-EE dyads responded to over half of messages from the patients with assertions of control, no matter what the control direction of the message was. Oddly, the group of relatives who were low EE and then changed to high EE in year 2 responded almost as rigidly, but submissively.

In order to assess the statistical significance of the differences between groups and assessments, a model...
comparing EE groups (E) and change over time (Y) was analyzed. Only the two major groups of dyads were compared, that is, the dyads with relatives who were low EE at base and year 2, and the dyads with relatives who were high EE at both the initial and last assessment. Tables 7 and 8 shows results from the best model, 
\[(EYAB)(EYBC)(EABC)], \quad LRX^2 = 49.0, df = 48, p = 0.43, n = 11,106.\) Effect (EAC) shows that patients with high-EE relatives were more likely to continue to assert control \((p < 0.05)\) and that, in contrast, patients with low-EE relatives were more likely to change control direction from one-up to one-across \((p < 0.01)\). Effect (EYB) shows almost no differences between the two types of dyads at baseline, but in year 1, low-EE relatives were more likely to assert control compared to high-EE relatives, and in year 2, high-EE relatives were significantly more likely to assert control \((p < 0.001)\). In year 2, low-EE relatives were also more likely than high-EE parents to respond submissively or neutrally \((p < 0.01)\). Thus, this analysis demonstrates statistically significant change over time and in the comparisons between the two groups at year 2.

All of the patients in the stable high-EE group were males. In order to test whether that difference accounted for the more assertive patterns in the high-EE families, patterns of control direction in the two types of families in the second year of the study were also compared using just males. Results of this analysis show the same marked difference in control patterning. Therefore, it is unlikely that the fact that the patients in the high-EE dyads were male accounted for the differences in patterns.

**Discussion**

This article describes changes in communication patterns in six groups of families of persons with schizophrenia who participated in the TSS study. Communication patterns at the initial assessment were similar in some ways to those described in earlier research. As expected, the initial process in dyads with high- and low-EE relatives was second order, homogeneous, and stationary. Dialogues in both types of dyads showed more complex structure after a year in the study. By the end of the second year, however, communication patterns in the dyads with a high-EE relative showed simple structure again, and communication in dyads with a low-EE relative became more complex and responsive. The second year assessments also showed increasing divergence between responses of relatives and patients in the stable high-EE dyads.

Earlier studies of communication patterns in families of persons with schizophrenia showed that families with high-EE parents were more responsive to one another, rather than less (e.g., Cook et al. 1989; Hahlweg et al. 1989; Wuerker 1996). These studies were of families of young patients who had just been hospitalized for the first time, who were probably quite different from the older, more chronic patients in the TSS study. The too "tightly joined" patterns described in the earlier studies were also highly conflictual, different from the flexible patterns shown by the dyads with low-EE relatives described here. It may be that heightened responsiveness is functional in a family as long as it is combined with flexibility. In fact, the absence of responsiveness in the high-EE dyads at baseline may reflect the creation of interpersonal distance as a way to cope with a difficult situation.

The analysis of control processes in the two groups showed interesting changes as well. Earlier research led us to expect that there would be more competitive symmetry and less neutral symmetry in the high-EE dyads. Initially, patterns in the low-EE dyads showed flexibility with some competitive symmetry but more neutral sym-

### Table 7. Standardized parameter estimates for control direction at assessment time: model \([(EYAB)(EYBC)(EABC)], \text{effect EAC}\)

<table>
<thead>
<tr>
<th>(EAC)</th>
<th>Patient at t</th>
<th>Patient at t + 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>High EE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑</td>
<td>2.45</td>
<td>0.45</td>
</tr>
<tr>
<td>↓</td>
<td>-0.56</td>
<td>-0.33</td>
</tr>
<tr>
<td>→</td>
<td>-1.68</td>
<td>0.10</td>
</tr>
<tr>
<td>Low EE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑</td>
<td>-2.45</td>
<td>-0.45</td>
</tr>
<tr>
<td>↓</td>
<td>0.56</td>
<td>0.33</td>
</tr>
<tr>
<td>→</td>
<td>1.68</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note.—↑ = one-up (move toward dominance); ↓ = one-down (move toward submission); → = one-across (neutralizing move); A = time τ; B = time τ + 1; C = time τ + 2; E = EE; EE = expressed emotion; Y = year of study. Table shows control direction of patient's message at t and t + 2 by EE (EAC). \(LRX^2 = 49.0, df = 48, p = 0.43, n = 11,106.\) Boldface indicates statistical significance.
have histories of mental illness, Goldstein makes a simi-
lar point (Goldstein 1995). Thus, research combining behav-
ioral, genetic, and physiological approaches might be very useful in understanding EE attitudes.

Control patterns in the five families who were low EE ini-
itally and then changed to high EE were quite different from the others. Initially, patients in these dyads were somewhat controlling toward their relatives, who fre-
quently yielded control. In year 2, the patterns were stronger, with the relatives extremely submissive. The high-EE attitudes and lower levels of satisfaction at year 2 may reflect the relatives’ discontent with a reverse hierar-
chy, that is, with a son or daughter being in charge. How-
ever, given that the mean age of patients in this study was over 29 years, there is no ideal hierarchical arrange-
ment. Even families with more functional adult children at home have problems with “who’s in charge,” and the problem is much more complex when the adult children have chronic mental illness.

Some of the divergence in responses between patients and high-EE relatives in year 1 and year 2 was be-
cause the patients moderated their responses more than the relatives did. Why this occurred is unknown, but it points to the importance of attending to the rela-
tive, the patient, and the relationship between them in any intervention. Otherwise, gains for one person in the dyad may be offset by processes that affect both mem-
bers negatively.

Some researchers argue that too little attention is paid to the protective effects of low-EE attitudes, and that low EE may have a stronger influence on course of illness than high EE. This study demonstrates the importance of family support for low-EE as well as high-EE relatives. In fact, the benefits for low-EE relatives seemed to have lasted longer. However, a low-EE attitude toward an off-
spring may not always be functional. For example, a study of symptom change in the same families as in the current report showed that when patients had increased levels of thought disturbance and hostility, low-EE par-

Table 8. Standardized parameter estimates for control direction at assessment time: model [(EYAB)(EYBC)(EABC)], effect EYB

<table>
<thead>
<tr>
<th></th>
<th>Parent at t + 1 (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>High EE</td>
<td></td>
</tr>
<tr>
<td>Base</td>
<td>0.83</td>
</tr>
<tr>
<td>Year 1</td>
<td>-6.55</td>
</tr>
<tr>
<td>Year 2</td>
<td>7.69</td>
</tr>
<tr>
<td>Low EE</td>
<td></td>
</tr>
<tr>
<td>Base</td>
<td>-0.83</td>
</tr>
<tr>
<td>Year 1</td>
<td>6.55</td>
</tr>
<tr>
<td>Year 2</td>
<td>-7.69</td>
</tr>
</tbody>
</table>

Note.—↑ = one-up (move toward dominance); ↓ = one-down (move toward submission); → = one-across (neutralizing move); A = time t, B = time t + 1; C = time t + 2; E = EE; EE = expressed emotion; Y = year of study. Table shows EE, year, and control direction of parent’s response at t + 1 (EYB). LRX² = 49.0, df = 48, p = 0.43, n = 11,106. Boldface indicates statistical significance.
ents were likely to respond to their offspring submissively. High-EE relatives responded in the opposite direction and were highly controlling toward their offspring (Wuerker and Long 1999). One response may not be better than the other.

Although female patients and African-American dyads were somewhat overrepresented in the LLL group, it is unlikely that the results were affected. A recent paper described gender and racial differences in EE and interpersonal control in many of the same families as the current study, and while there were marked differences in high-EE families, there were few in low-EE families (Wuerker et al. 1999).

The study demonstrates that relatives who remain high EE may need long-term support. Education about symptoms and help with problem solving may not be sufficient for these relatives, if control is the issue. Perhaps very specific interventions targeting the symptoms that are most bothersome to the relative would be more helpful.

Family therapists and theorists have long considered flexibility to be an essential trait for good family functioning (e.g., Minuchin and Fishman 1981; Rolland 1994), particularly when families are faced with a severe chronic illness. An important finding in the current study is that many patients and parents are able to respond flexibly to each other despite the presence of a severe chronic mental illness. It is encouraging that family intervention can increase that flexibility, even in families that have had to deal with schizophrenia for years.

References


Bellack, A.S.; Haas, G.L.; Schooler, N.R.; and Flory, J. The effects of behavioral family treatment on family communication and patient outcomes in schizophrenia. Submitted for publication.


Acknowledgments

Support for this research was provided by grant RO3-MH53424 from the National Institutes of Health (A.K. Wuerker, Ph.D., P.I.). The treatment trial from which these data were made available was conducted under the Treatment Strategies in Schizophrenia (TSS) Cooperative Agreement Program funded by the NIMH. The video-taped family interaction and the Five-Minute Speech Sample data were collected, in part, with support from NIMH grant RO1-MH41577 (A.S. Bellack, Ph.D., P.I.).

Note: The Treatment Strategies in Schizophrenia Cooperative Agreement Program was a multicenter clinical trial carried out by five research teams in collaboration with the Division of Clinical and Treatment Research of the National Institute of Mental Health. The NIMH principal collaborators are Nina R. Schooler, Ph.D.; Samuel J. Keith, M.D.; Joanne B. Severe, M.S.; and Susan M. Matthews. The NIMH principal collaborators for the Adjunctive Lithium Trial are C. Charles Schultz, M.D., and Carol L. Odbert. The principal investigators and co-principal investigators at the five sites are Hillside Hospital—Long Island Jewish Medical Center, Glen Oaks, NY, U01 MH39992: John M. Kane, M.D., Jeffrey A. Lieberman, M.D., and Margaret Woerner, Ph.D.; Medical College of Pennsylvania at Eastern Pennsylvania Psychiatric Institute, Philadelphia, PA, U01 MH39998: Alan S. Bellack, Ph.D., and George M. Simpson, M.D.; Cornell University Medical College and Payne Whitney Clinic, New York, NY, U01 MH 40007: Ira D. Glick, M.D., and Allen Frances, M.D.; University of California at San Francisco and San Francisco General Hospital, San Francisco, CA, U01 MH400042: William A. Hargreaves, Ph.D., and Marc Jacobs, M.D.; Emory University and Grady Memorial Hospital, Atlanta, GA, U01 MH40597: Philip T. Ninan, M.D., and Rosalind M. Mance, M.D. Consultants for Applied Family Treatment are Ian R.H. Faloon, M.D., Buckingham Hospital, Buckingham, U.K., and Christine W. McGill, Ph.D., University of California at San Francisco and San Francisco General Hospital, San Francisco, CA.

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